WHAT IS CLAIMED IS:

1. An adaptive controller for adaptively controlling a plurality of variable high frequency devices, said adaptive controller comprising:

a calculation part that calculates a scalar function value by using a signal varied in accordance with impedances of the variable high frequency devices, a reference signal, and a predetermined scalar function;

an impedance variation part that creates a signal that sequentially varies the impedances of the variable high frequency devices; and

a determination part that, when an impedance of one of the variable high frequency devices is varied, determines whether a direction in which the scalar function value is varied is in a predetermined sloped direction,

the impedance variation part comprising:

a first variation part that, when the determination part determines the direction in which the scalar function value is varied is in the predetermined sloped direction, creates a signal that further varies the impedance of said one of the variable high frequency devices in the predetermined sloped direction; and

a second variation part that, when the determination part determines the direction in which the scalar function value is varied is not in the predetermined sloped direction, creates one of a signal that varies the impedance of said one of the variable high frequency devices in a oppositely sloped direction and a signal that varies an impedance of another one of the variable high

frequency devices.

2. The adaptive controller as claimed in claim 1, wherein the determination part includes a first determination part that determines whether sequentially obtained three or more scalar function values are continuously increased or continuously decreased.

3. The adaptive controller as claimed in claim 1, wherein the determination part includes a second determination part that determines whether sequentially obtained K scalar function values are continuously increased or continuously decreased, and a value of the K is varied depending on an amount of noise included in a signal that is varied in accordance with the impedance of the one of the variable high frequency devices.

4. The adaptive controller as claimed in claim 1, wherein, when the determination part determines that the direction in which the scalar function value is varied is still not in the predetermined sloped direction after creation of the signal that varies the impedance of the one of the variable high frequency devices in the oppositely sloped direction, the second variation part creates a signal that varies the impedance of the another

variable high frequency device.

5. The adaptive controller as claimed in claim 4, wherein the impedance variation part increases and then decreases respective impedances of a part of the variable high frequency devices, and decreases and then increases respective impedances of another part of the variable high frequency devices.

6. The adaptive controller as claimed in claim 1, wherein the impedance variation part sequentially varies the impedances of the variable high frequency devices in one direction, and thereafter creates a signal that sequentially varies the impedances of the variable high frequency devices in another direction.

7. The adaptive controller as claimed in claim 1, further comprising:

a step size adjusting part that adjusts variations of the impedances of the variable high frequency devices.

8. The adaptive controller as claimed in

claim 7, wherein at least one variation is varied when an impedance of one of the variable high frequency devices is varied.

9. The adaptive controller as claimed in claim 7, wherein at least one variation is reduced at a fixed ratio when an impedance of one of the variable high frequency devices is varied.

10. The adaptive controller as claimed in claim 1, further comprising:

a common signal form conversion part that supplies to each of the variable high frequency devices a signal that varies the impedance of the variable high frequency device.

11. The adaptive controller as claimed in claim 1, wherein the calculation part outputs to the determination part an average value of a plurality of scalar function values.

12. The adaptive controller as claimed in claim 1, wherein the calculation part outputs to the determination part a linear combination of a plurality of scalar function values calculated by

using a forgetting factor.

13. The adaptive controller as claimed in claim 1, wherein the variable high frequency devices are connected to a plurality of antenna elements forming an adaptive array antenna.

14. The adaptive controller as claimed in claim 13, wherein each of the variable high frequency devices is formed by one of a variable capacitance element and a variable inductance element connected in series to a corresponding one of the antenna elements to which power is supplied.

15. The adaptive controller as claimed in claim 1, wherein the reference signal is formed by a demodulated signal subjected to error correction.

16. The adaptive controller as claimed in claim 1, wherein the variable high frequency devices form a high frequency circuit of a mobile communication apparatus.

17. A wireless receiver having the adaptive controller as claimed in claim 1 and obtaining from a radio received signal the signal that is varied in accordance with the impedances of the variable high frequency devices, said wireless receiver comprising:

an impulse response estimator that estimates an impulse response of a transmission channel by using the radio received signal;

a correction part that creates a corrected impulse response by removing a part of paths included in the impulse response;

a demodulator that performs error correction on the received signal and creates a demodulated signal;

a reference signal creation part that creates the reference signal by using the demodulated signal; and

a transmission signal estimator that, by using the corrected impulse response and the reference signal, estimates a transmission signal transmitted to the wireless receiver,

wherein the scalar function value is calculated based on a difference between the received signal and the estimated transmission signal.

18. An adaptive control method of adaptively controlling a plurality of variable high frequency devices, said method comprising the steps of:

varying an impedance of one of the variable high frequency devices;

calculating a scalar function value by using a signal varied in accordance with impedances of the variable high frequency devices, a reference signal, and a predetermined scalar function;

when the impedance of the one of the variable high frequency devices is varied, determining whether a direction in which the scalar function value is varied is in a predetermined sloped direction;

when it is determined that the direction in which the scalar function value is varied is in the predetermined sloped direction, further varying the impedance of the one of the variable high frequency devices in the predetermined sloped direction;

when it is determined that the direction in which the scalar function value is varied is not in the predetermined sloped direction, varying the impedance of the one of the variable high frequency devices in an oppositely sloped direction; and

when it is determined that the direction in which the scalar function value is varied is not in the predetermined sloped direction after performing the step of varying the impedance of the one of the variable high frequency devices in the oppositely sloped direction, varying an impedance of another one of the variable high frequency devices.

19. An adaptive control method of adaptively controlling a plurality of variable high frequency devices, said method comprising:

a first step of varying an impedance of one of the variable high frequency devices;

a second step of calculating a scalar

function value by using a signal varied in accordance with impedances of the variable high frequency devices, a reference signal., and a predetermined scalar function;

a third step of determining, when the impedance of the one of the variable high frequency devices is varied, whether a direction in which the scalar function value is varied is in a predetermined sloped direction;

a fourth step of further varying, when it is determined that the direction in which the scalar function value is varied is in the predetermined sloped direction, the impedance of the one of the variable high frequency devices in the predetermined sloped direction;

a fifth step of varying, when it is determined that the direction in which the scalar function value is varied is not in the predetermined sloped direction e, an impedance of another one of the variable high frequency devices;

a step of sequentially varying the impedances of the variable high frequency devices by repeating the first through fifth steps;

a step of varying the impedance of the one of the variable high frequency devices in an oppositely sloped direction; and

a step of sequentially varying the impedances of the variable high frequency devices by repeating the second through fifth steps.